

Anisotropic Colloid Properties of Sapphire Surfaces

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Understanding the interplay between atomic surface structure and the colloidal behavior of materials is critical to the development of advanced colloid technologies. In this study, streaming potential measurements were made on three orientations of sapphire to probe changes in surface potential as a function of pH. Anisotropies in the isoelectric points are correlated to variances in the acidities of each surface, where the isoelectric point of the most acidic surface is located at the lowest pH value. This behavior is explained in terms of the coordination of the first layer of aluminum atoms at the surface. The observation of such anisotropy represents a significant advancement in the field of colloid science, and the success of this work lays the grounds for similar studies on other ceramic systems of interest.

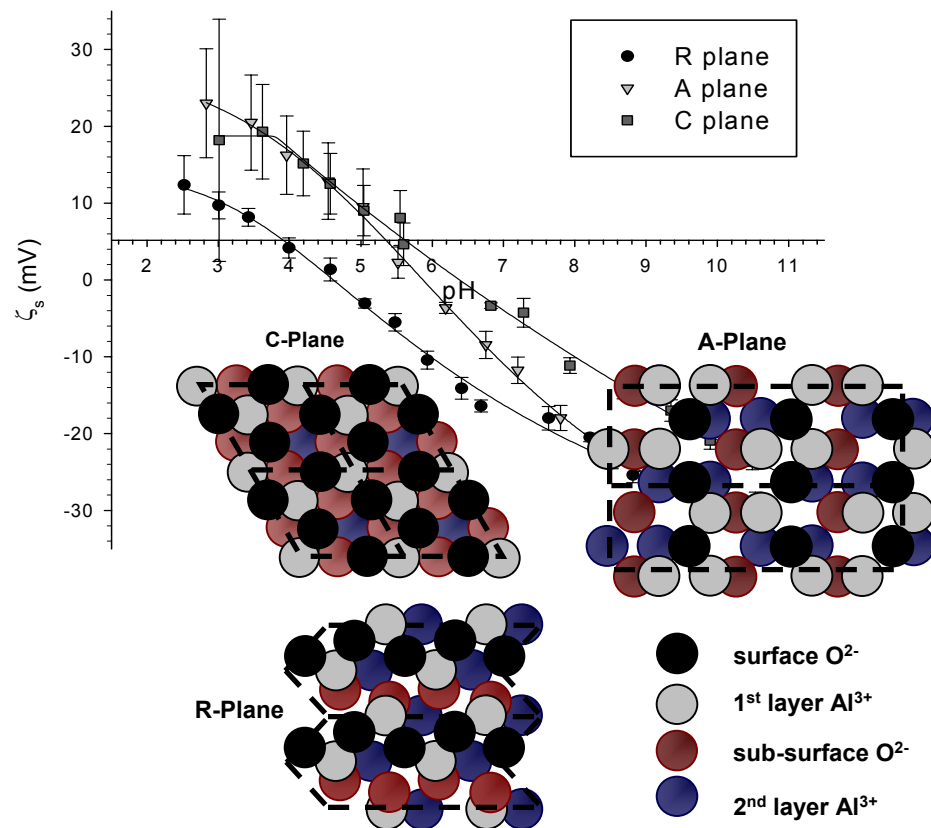


Figure: Isoelectric points differ for different orientations of sapphire (graph), and are attributed to unique atomic coordinations on each of the three surface planes (illustration). These data illustrate an important structure-property relationship